To

The Asst. Registrar (Research),

M.D.S. University, Ajmer

Sub: Regarding submission of revised synopsis.

Reference: Yours letter no. F-15/Research/M.D.S.U/25013,

dated 19/06/2018

Respected Sir,

In reference to above sub.& letter here with I am submitting one copy of revised synopsis as per the DRC recommendation, dated17,May 2018. Submitted for necessary action and information please.

Date..3/7/18

Sig. 3/7/18

Giriraj Prasad Jangir

(Name of research scholar)

Office, Principal Govt. P.G. College Tonk

Reference No.....1493 .Date...3/7/18.....

Original application of Giriraj Prasad Jangir(research scholar) Deptt. of Mathematics Govt. P.G.College Tonk along with revised synopsis is forwarded to Asst. Registrar (Research) M.D.S. University, Ajmer for necessary action.

Signature

Supervisor & Head

Deptt. of Mathematics

Signature 03-7-18

Principal

Govt. P.G.College Tonk

प्राचार्य
राजकीय स्नातकोत्तर महाविद्यालय
टोंक (राज.) DDO Code-0294

महर्षि दयानन्द सरस्वती विश्वविद्यालय, अजमेर

शोध पंजीयन हेतु आवेदन पत्र

विभागाध्यक्ष,
.....
म.द.स. विश्वविद्यालय,
अजमेर।

प्राचार्य,
Govt. P.G. College, Tonk

विषयः– शोध पंजीयन हेतु आवेदन।

महोदय / महोदया,

विषयान्तर्गत निवेदन है कि विश्वविद्यालय के परिपत्र क्रमांकः एफ–15 / शोध / मदसविवि / 69459 दिनांक ..... में वर्णित सूचना के अनुसार मैनें निर्धारित कोर्स वर्क सफलतापूर्वक पूर्ण कर लिया है और इस परिपत्र के बिन्दु संख्या–1 में दिये गये निर्देशों के अनुसार शोध पंजीयन हेतु यह आवेदन निम्नांकित याचनीयता पूरी करते हुए प्रस्तुत कर रहा हूं / रही हूं :–

1. मुझे आवंटित शोध पर्यवेक्षक डॉ. Deepak Raj Jain ..... हैं उन्होंने यह आवेदन पत्र मय दस्तावेज अग्रेषित कर दिया है।
2. आवेदन शुल्क राशि रू.500 / – का डी.डी. नं. ..... दिनांक ..... (कुलसचिव, महर्षि दयानन्द सरस्वती विश्वविद्यालय, अजमेर के नाम)
3. अध्यादेश 124.10 में निर्धारित परिशिष्ठ–IV के अनुसार Format for outline of Proposed Research Work (6 प्रतियों) में वांछित शोध पर्यवेक्षक के प्रमाण पत्र, (परिशिष्ठ– VI) के साथ संलग्न है।

आपसे अनुरोध है कि कृपया इस आवेदन पत्र को संलग्न दस्तावेजों के साथ निदेशक शोध, म.द.स. विश्वविद्यालय, अजमेर को शोध पंजीयन की कार्यवाही हेतु अग्रेषित करावें।

मुझे ज्ञात है कि शोध पंजीयन से शोधोपाधि प्राप्त होने की अवधि में मैं अन्य कोई उपाधि पाठ्यक्रम में प्रवेश नहीं ले सकता / सकती। यदि इस विश्वविद्यालय या किसी अन्य विश्वविद्यालय से कोई डिप्लोमा या सर्टिफिकेट (नियमित / पार्ट टाईम / दूरस्थ शिक्षा) इस अवधि में करना चाहूंगा / चाहूंगी तो वह मैं तब ही करूंगा / करूंगी जब मुझे मेरे शोध पर्यवेक्षक यह प्रमाण पत्र दे देंगे कि इस पाठ्यक्रम को करने से शोध कार्य बाधित नहीं होगा।

संलग्न– उपर्युक्त

दिनांक 2/7/18

Gmaj प्रार्थी,

हस्ताक्षर .....
पूरा नाम एवं पता Girdhiraj Prasad Jangir
Vill.-Aakodiya, Teh.- Newai
Dist. Tonk (Raj.)
टेलीफोन / मोबाईल नं0 7597120850

आवंटित सेवारत शोध पर्यवेक्षक की अग्रेषण टिप्पणी

मैं, डॉ0 Deepak Raj Jain ..... इस विश्वविद्यालय का पंजीकृत शोध पर्यवेक्षक हूं। वर्तमान में Govt. P.G. College Tonk में कार्यरत हूं। मेरी सेवानिवृत्ति की दिनांक 31/12/2025 है। शोध पंजीयन हेतु उक्त आवेदन पत्र मय संलग्न दस्तावेज निदेशक, शोध, म.द.स. विश्वविद्यालय को कृपया अग्रेषित कराएं।

दिनांक : 2/7/18

हस्ताक्षर .....
नाम Dr. Deepak Raj Jain
टेलीफोन / मोबाईल नं0 9414201348

विभागाध्यक्ष (गणित)
राजकीय महाविद्यालय, टोंक

आवंटित सेवानिवृत्त शोध पर्यवेक्षक की अग्रेषण टिप्पणी

मैं, डॉ0 ..... इस विश्वविद्यालय का पंजीकृत शोध पर्यवेक्षक हू। मैं दिनांक ..... को ..... से सेवानिवृत हो चुका हू। उक्त अभ्यर्थी को .....विभाग / महाविद्यालय में शोध करने की अनुमति प्राप्त कर ली है, जो संलग्न है। शोध पंजीयन हेतु उक्त आवेदन पत्र मय सलग्न दस्तावेज निदेशक, शोध, म.द.स. विश्वविद्यालय को कृपया अग्रेषित कराएं।

दिनांक :

हस्ताक्षर .....
नाम .....
टेलीफोन / मोबाईल नं0 .....

क्रमांक:

दिनांक: 2/7/18

निदेशक (शोध)
म.द.स. विश्वविद्यालय, अजमेर– 305009

शोधार्थी Giriraj Prasad Jangir का शोध पंजीयन हेतु आवंटित शोध पर्यवेक्षक से अनुशंषित आवेदन पत्र मय संलग्न उपर्युक्त दस्तावेजों के साथ शोध पंजीयन हेतु अग्रेषित है।

03-7-18

हस्ताक्षर एवं सील प्राचार्य / विभागाध्यक्ष

राजकीय स्नातकोत्तर महाविद्यालय
बांक (राज.) DDO Code-0294

शोध अनुभाग के उपयोग हेतु

आवेदन पत्र की जांच कर ली गई है। अतः संबंधित शोध पंजीयन समिति की बैठक में निर्णयार्थ रखे जाने योग्य है

हस्ताक्षर जांच कर्ता

अथवा

आवेदन पत्र की जांच की गई और निम्न कमियां पाई गई जिनकी पूर्ति करायी जानी है :–

1.

2.

3.

आवेदन पत्र में पाई गयी उक्त कमियां अभ्यर्थी द्वारा दिनांक ..... को पूरी कर दी गयी है। अतः संबंधित विषय शोध समिति की बैठक में निर्णयार्थ रखे जाने योग्य है।

हस्ताक्षर जांच कर्ता

Maharshi Dayanand Saraswati University, Ajmer

Following corrections are done-

Sr. No.	description	Before	After correction	Page No.
1	Title of research work	Study Of Cosmological Models With Electromagnetic Field In General Relativity	Study Of **Some** Cosmological Models With Electromagnetic Field In General Relativity	1 and inside also
2	Chapterization	We divide our research work into the following chapters	We **propose** our research work into the following chapters	6
3	Chapterization	Study of electromagnetic models in general relativity with different binchies identities and got results	Study of electromagnetic models in general relativity with different binchies **type** identities and got results	6
4	Chapterization	Study of cosmological models in lyra geometry and got results	Study of cosmological models in lyra geometry	6
5	Research methodology	Some mathematical techniques, which include ordinary differential equation, partial differential equation etc	Some mathematical techniques, **use for solution of ordinary differential equation and partial** differential equation etc	14

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Sig. of Supervisor

(Dr. Deepak Raj Jain)

विभागाध्यक्ष (गणित)
राजकीय महाविद्यालय, टोंक

.....02/07/18.....

Sig. of Student

(Giriraj Prasad Jangir)

STUDY OF SOME COSMOLOGICAL MODELS WITH ELECTROMAGNETIC FIELD IN GENERAL RELATIVITY

A

SYNOPSIS

SUBMITED TO

Maharshi Dayanand Saraswati University, Ajmer

For the award of the Ph.D. degree in Mathematics

Supervisor

Dr. Deepak Raj Jain

By:

Giriraj Prasad Jangir

Department of Mathematics

Government P.G.College, Tonk

November, 2017

APPENDIX-IV

MAHARSHI DAYANAND SARASWATI UNIVERSITY,

AJMER

Format For Outline Of Proposed Research Work

(to be supplied in six copies)

1. Name of Scholar:

(In English) Giriraj Prasad Jangir

(In Hindi) गिरिराज प्रसाद जाँगिड

2. Title of Research Work:

(In English) Study of Some Cosmological Models with Electromagnetic Field in General Relativity

(In Hindi)) सामान्य सापेक्षता में विद्युत चुम्बकीय क्षेत्र के साथ ब्रह्माण्ड संबंधी कुछ मॉडलों का अध्ययन

3. Location: Department of Mathematics Government P.G.College, Tonk

4. Introduction Importance of Proposed Investigation, Objective:

In order to understand theory of general relativity, it is necessary to know its beginning. In 1686, the theory of gravitation was proposed by Sir Isaac Newton. A genius mathematician Albert Einstein in the year 1905, he proposed a special relativity in his paper, "On the electrodynamics of moving bodies". The theory Einstein's has been applied only for the particular case of inertial reference frames i.e. frame of reference in uniform relative motion with respect to each other but the absolute motion of body cannot be measured in special theory of relativity. Hence special theory relativity does not help to gravitation in its structure. So special theory of relativity fails to put up the fundamental ideas of relativity of all kind of motion and gravitation. In this relation, Albert Einstein generalized the special theory of relativity and Universal law of gravitation, providing unified description of gravity as a geometric property of space-time. Einstein's general theory of relativity is more simplest and accurate theory that consistent with experimental evidences and describe the fact of gravitation in the physics.

The field equations of general relativity are,

$$G_{ij} \equiv R_{ij} - \frac{1}{2} g_{ij} R = -8\pi T_{ij}$$

Where, $G_{ij} = Einstein\ tensor$

$R = scalar\ curvature$

$R_{ij} = Ricci\ tensor$

$T_{ij} = energy\ momentum\ tensor$

The general theory of relativity is one of the most attractive structures in theoretical physics. The general relativity and cosmology both are associated to each other. The principles of general relativity are successful in the gravitation

and gravitation controls the entire large scale structure of universe. This gives lot of information about the universe. The modern scientific cosmology was invented in 1917 by Albert Einstein. He has proposed the final modification of general relativity in his paper, "Cosmology consideration of the general theory of relativity".

The big bang theory has dominated to modern cosmology which attempts to bring together observational astronomy and particle physics. For the study of the cosmology we have to assume certain things, the universe consider as a huge ball containing simple non-viscous fluid called perfect fluid having proper density ρ and pressure p. The universe is assume for large scale point of view a large scale helps to universe appear as to be regular than matter distribution is homogeneous and isotropic. Because of isotropy the distribution of matter is same in all direction.

Classification of cosmological models through bianchi classification, homogeneous, nonhomogeneous, cylindrical symmetry etc. Bianchi classification nine possible isometry classes of three dimensional Lie groups of isometries of Riemannian manifold. It plays a fundamental role for understanding the Einstein field equation.

In this we research on this-

The topic – "**STUDY OF SOME COSMOLOGICAL MODELS WITH ELECTROMAGNETIC FIELD IN GENERAL RELATIVITY**" in this research we will investigate various type of cosmological Models with electromagnetic field with various conditions. Authors Raj Bali, Anirudh Pradhan, Anju Rai, Sheel Kumar Singh, M.Abdel-Megied, Ragab M. Gad, E. A. Hegazy, S. D. Deo, Gopalkrishna S. Punwatkar, Umesh M.Patil, Barkha R. Tripathi, Atul Tyagi, Swati Parikh, H. Amirhashchi and H. Zainuddin have made significant contribution in this field. We try to find some homogeneous, inhomogeneous, tilted and anisotropic cosmological models whih different type of bianchies. Also

we will study of all models with respective physical and geometrical behaviour of the models.

Importance:

This research will help in study of cosmos and in further research. Through this research we will find new cosmological models with electromagnetic field with differet-2 situations. They will create deeper understanding about cosmological behavior.

Objective:

a) The purpose of the study is to develop deeper understanding about the cosmos.
b) To create a cosmological model that will be helpful in the study of the cosmos.
c) To analyze current cosmological models with electromagnetic field.
d) To analyze the geometrical properties of cosmological models with electromagnetic field.
e) To analyze the physical properties of the cosmological models with electromagnetic field.
f) To construct the cosmological models with the help Bianchi types, various fluids and electromagnetic field in the theory of relativity for various energy sources.

5. Chapterization :

We propose our research work into the following chapters-

a) Introduction of cosmological models, electromagnetic fields, viscous fluid and all type of binchies identities
b) Study of homogeneous cosmological with electromagnetic field and got results.
c) Study of electromagnetic models in general relativity with different binchies type identities and got results.
d) Study of cosmological models in lyra geometry.
e) Discuss physical and geometrical significance of all above models and get result.

6. Review of literature:

Reviews of literature which help studying the background of the various types of cosmological models in general relativity. It also helps to provide the basic knowledge of cosmological models on various situations and motivates to create the new cosmological models in general relativity.

- **In (1987) [1] Raj Bali, Ghanshyam Singh and Atul Tyagi** are discussed some inhomogeneous cosmological models of plane symmetry in presence of electromagnetic field have been obtained. Various physical and geometrical properties of the models with some special cases are also discussed.

- **In (1990) [2] Raj Bali And Atul Tyagi** are investigated a plane symmetric inhomogeneous cosmological modal of perfect fluid

distribution with electromagnetic field, is obtained. $F_{12}$is the non-vanishing component of the electromagnetic field tensor. To get a determinate solution, we assume the free gravitational field is Petrov type-II non-degenerate. In general, the model represents an expanding, shearing, non-rotating universe in which the flow vector is geodetic. The behavior of the electromagnetic field tensor together with some geometrical and physical aspect of the model are also discussed.

- **In (2001) [3] Anirudh Pradhan And V. Kumar Yadav** consider a magnetic cylindrically symmetric universe with a plane-symmetric inhomogeneous viscous fluid cosmological model with electromagnetic field. The viscosity coefficient of bulk viscous fluid is assumed to be a power function of mass density. To get a determinate solution, we assume the free gravitational field to be Petrov type-II non-degenerate. Without assuming any ad hoc law, we obtain a cosmological constant as a decreasing function of time. The behaviour of the electromagnetic field tensor togetherwith some physical aspects of the model are also discussed.

- **In (2007)[4] Anirudh Pradhan · Anju Rai · Sheel Kumar Singh** are investigated cylindrically symmetric inhomogeneous string cosmological model in presence of electromagnetic field is investigated. They assumed that F_{23} is the only non-vanishing component of F_{ij}. To get the deterministic solution, it has been assumed that the expansion ? in the model is proportional to the eigenvalue σ_1^1 of the shear tensorσ_j^i. The physical and geometric aspects of the model are also discussed.

- **In (2010)[5] Anirudh Pradhan, Suman Lata, And H. Amirhashchi** are investigated that exact solution of Einstein's

field equations is obtained for massive string cosmological model of Bianchi III space-time using the technique given by Letelier (1983) in presence of perfect fluid and electromagnetic field. To get the deterministic solution of the field equations the expansion ⍰ in the model is considered as proportional to the eigen valueσ_2^2 of the shear tensor σ_i^j and also the fluid obeys the barotropic equation of state. It is observed that in early stage of the evolution of the universe string dominates over the particle whereas the universe is dominated by massive string at the late time. It is also observed that the string phase of the universe disappears in our model because particle density becomes negative. Some physical and geometric properties of the model are also discussed.

- **In (2010) [14]Rishi Kumar Tiwari** investigated that Einstein's field equations with variable gravitational and cosmological constants are considered in the presence of perfect fluid for the Bianchi type-I universe by assuming that the cosmological term is proportional to R^{-m}(R is a scale factor and m is a constant). A variety of solutions are presented. The physical significance of the respective cosmological models are also discussed.

- **In (2011)[6] Anirudh Pradhan · H. Amirhashchi · H. Zainuddin** are investigated a new class of exact solutions of Einstein's modified field equations in inhomogeneous space-time for perfect fluid distribution with electromagnetic field is obtained in the context of normal gauge for Lyra's manifold. They obtained solutions by considering the time dependent displacement field. The source of the magnetic field is due to an electric current produced along the z-axis. Only F_{12} is a non-vanishing component of the electromagnetic field tensor. It has been found that the displacement vector $\beta(t)$ behaves like the cosmological constant Λ

in the normal gauge treatment and the solutions are consistent with the recent observations of Type Ia supernovae. Physical and geometric aspects of the models are also discussed in the presence of magnetic field.

- **In (2012)[16] Raj Bali And Meghna Kumawat** are investigated cosmological models with variable gravitational constant (G) and bulk viscosity in C-field cosmology for flat FRW space-time. To get the deterministic model of the universe, we have assumed G = Rn where R is the scale factor and n is a constant. Under this assumption, we have investigated two C-field cosmological models for two cases: (i) $\zeta\theta$ = constant, (ii) ζ = constant, $\boldsymbol{\theta} = \frac{3\dot{R}}{R}$ where ζ is the coefficient of bulk viscosity, ? the expansion in the model. The physical and geometrical aspects of the models and the effect of bulk viscosity related with the observation are discussed.

- **In (2013)[15] V. G. Mete, V.D.Elkar** have investigated bianchi Type-II space time is investigated in presence of bulk stress given by Landau and Lifshitz. To get a solution, a supplementary condition between metric potentials is used. The viscosity coefficient of bulk viscous fluid is assumed to be a simple power function of mass density where as the coefficient of shear viscosity is consider as proportional to the scale of expansion in the model. The cosmological term is found to be a decreasing function of time, which is supported by results found from recent type Ia supernovae observations. Also some physical and geometrical properties of the model are discussed.

- **In (2013)[7] Ajay Singh, R. C. Upadhyay and Anirudh Pradhan** are investigated that the present study deals with exact solution of Einstein's field equations in a spatially homogeneous and anisotropic Bianchi III space-time representing massive string in presence of bulk viscosity and electromagnetic. The source of the magnetic field is due to an electric current produced along the z-axis. F_{12} is the non-vanishing component of electromagnetic field tensor. To get the deterministic solution of the field equations, we assume (i) the expansion ?in the model is proportional to the eigne value σ_2^2 of the shear tensor σ_i^j and (ii)

the coefficient of bulk viscosity is assumed to be a power function of mass density ($\xi = \xi o \rho^{\kappa}$), where ξo and κ are real constants. It is observed that the particle density and the tension density of the string are comparable at the two ends and they fall off asymptotically at similar rate. But in early stage as well as at the late time of the evolution of the universe we have two types of scenario (i) universe is dominated by massive strings and (ii) universe is dominated by strings depending on the nature of the constants. Some physical and geometric properties of the model are also discussed.

- **In (2014)[8] M. Abdel-Megied , Ragab M. Gad And E. A. Hegazy** have investigated an inhomogeneous Bianchi type-I cosmological model with electromagnetic field based on Lyra geometry. A new class of exact solutions have been obtained by considering the potentials of metric and displacement field are functions of coordinates t and x. The physical behavior of the obtained model is discussed.

- **In (2014) [9] Raj Bali, Anirudh Pradhan & Anju Rai** have investigated Cylindrically symmetric inhomogeneous string cosmological models in the presence of electromagnetic field are investigated. We have assumed that F_{12} is the only non-vanishing component of F_{ij}.The Maxwell's equations require that F_{12} is the function of x and t both and the magnetic permeability is the function of x and t both. To get the deterministic solution, it has been assumed that the expansion ⍰ in the model is proportional to the eigen σ_1^1value of the shear tensor σ_j^i . The derived model represents the inflationary scenario as the proper volume increases exponentially with cosmic time. It is observed that the model has a point type singularity. The physical and geometric aspects of the model are also discussed.

- **In(2014)[13] S. D. Deo, Gopalkrishna S. Punwatkar and Umesh M. Patil** have investigated anisotropic Bianchi type –I cosmological model is studied in General Theory of relativity with the matter wet dark energy. To determine the model, we assume that $\frac{\dot{A}}{A} = \frac{\dot{B}}{B} = \frac{\alpha_1}{t^n}$ and $\frac{\dot{C}}{C} = \frac{\alpha_2}{t^n}$ where α_1, α_2 are constant. Further various solutions are obtained and some physical and kinematical properties of the model have also been discussed

- **In (2015) [10] S. D. Deo, Gopalkrushna S. Punwatkar and Umesh M. Patil** are discussed Bianchi type –III Cosmological

model filled with a magnetized Cosmic strings is investigated in general relativity. They assume that $F_{23}$is only non-vanishing component of electromagnetic field tensor F_{ij}.. We obtain exact solution by assuming that the expansion ?in the model is proportional to the shear ? which leads to $C = B^n$ where B and C are functions of time only. The physical and geometrical behavior of cosmological model are discussed.

- **In (2016)[18]Arvind Sharma, Atul Tyagi & Dhirendra Chhajed** have investigated inhomogeneous Bianchi type VIo string cosmological model for stiff perfect fluid in general relativity. To obtain the deterministic solution of Einstein's field equations, we assume that the isotropic pressure is equal to string rest density i.e. p = ρ. The model obtained is expanding, shearing and non-rotating universe. Some physical and geometrical features of the model are also discussed.

- **In (2016) [11] M. Abdel-Megied and E. A. Hegazy** are investigated bianchi type VI cosmological model in the presence of electromagnetic filed with variable magnetic permeability in the frame work of Lyra geometry is presented. An exact solution is introduced by considering that the eigne valueσ_3^3 of the shear tensorσ_i^j is proportional to the scalar expansion ? of the model, that is $C = (AB)^L$, where A,B and C are the coefficients of the metric and L is a constant. Bianchi type V, III and I cosmological models given as a special cases of Bianchi type VI. Physical and geometrical properties of the models are discussed.

- **In (2017) [17]Marek Szyd lowski, Aleksander Stachowski** have investigates the dynamics of the generalized ΛCDM model, which the Λ term is running with the cosmological time. On the example of the model $\Lambda(t) = \Lambda_{bare} + \frac{\alpha^2}{t^2}$ they show the existence of a mechanism of the modification of the scaling law for energy density of dark matter: $\rho_{dm} \propto \alpha^{-3+\lambda(t)}$. We use an approach developed by Urbanowski in which properties of unstable vacuum states are analyzed from the point of view of the quantum theory of unstable states. We discuss the evolution of Λ(t) term and pointed out that during the cosmic evolution there is a long phase in which this term is approximately constant. We also present the statistical analysis of both the Λ(t)CDM model with dark energy and decaying dark matter and the ΛCDM standard cosmological model. We use data such as Planck, SNIa, BAO, H(z) and AP test.

While for the former we find the best fit value of the parameter $\Omega_{\alpha^2,o}$ is negative (energy transfer is from the dark matter to dark energy sector) and the parameter $\Omega_{\alpha^2,o}$ belongs to the interval $(-0.000040,-0.000383)$ at 2-σ level.

- The decaying dark matter causes to lowering a mass of dark matter particles which are lighter than CDM particles and remain relativistic. The rate of the process of decaying matter is estimated. Our model is consistent with the decaying mechanism producing unstable particles (e.g. sterile neutrinos) for which α^2 is negative.

- **In (2017)[12] Barkha R.Tripathi1, Atul Tyagi & Swati Parikh** are investigated an inhomogeneous string cosmological model in the presence of electromagnetic field. They assumed that F_{12} is the only non-vanishing component of electromagnetic field tensor F_{ij}. The metric potentials are functions of x and t both. To get the deterministic solution, it has been assumed that the expansion (θ) in the model is proportional to the eigenvalue σ_1^1 of the shear tensorσ_j^i . The derived model represents the inflationary scenario as the proper volume increases exponentially with cosmic time. It is observed that the model has a Barrel type singularity. The behavior of the electromagnetic field tensor together with physical and geometrical aspects of the model is also discussed.

7. Research gap:

We find out the following research gap in "Study of Some Cosmological Models with Electromagnetic Field In General Relativity" since last few years-

- Some Homogeneous Cosmological Models Of Plane Symmetry With Electromagnetic Field,
- Bianchi Type –IX Cosmological Model Electromagnetic Field With Cosmic Strings In General Theory
- Cylindrically Symmetric Homogeneous Universe With Electromagnetic Field In String Cosmology
- Inhomogeneous Bianchi Type-III Cosmological Model With Electromagnetic Field In Lyra Geometry

8. Hypothesis, if any: -

New dimensions will be introduce in the field of Study of Some Cosmological Models with Electromagnetic field. And new research field may be progress.

9. Research methodology:

In this research, the useful sources are:

a) Some mathematical techniques, use for solution of ordinary differential equation and partial differential equation etc.

b) Computer techniques, which include MATLAB to solve the typical calculation of the model.

c) Collection of the corresponding reference books, Research papers related to our topic from renowned institute and libraries like the Inter University Center for Astronomy and Astrophysics (IUCAA), Pune and JJTU Library etc.

d) The following steps are taken in the research work:

(i) Study of the literature to learn more about the cosmology

(ii) To visit to the Library

(iii) To learn how to create a new cosmological model

(iv) To learn Matlab software to solve governing equation system

e) For the completion of proposed work we will find out the physical properties of the cosmological models with electromagnetic field such as pressure (P), density (ρ) and volume (V)

f) We will find the geometric properties shear scalar (σ), expansion scalar (θ).

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This is to certify that Mr./Mrs.....**GIRIRAJ PRASAD JANGIR**.....son of/Daughter of Mr...**BHAIRU LAL JANGIR**...has qualified/not qualified the course work of parer-II& III for Registration for the Ph.D programme in the Department of .....**MATHEMATICS**....of the Certificate .....**GOVT. POST GRADUATE COLLEGE TONK RAJ**...(name of the College/University) on.....(date/month/year).

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This is to certify that Mr./Ms. ***Giriraj Prasad Jangir*** *Son/D/o Mr.* ***Bhairu Lal Jangir*** *has attended and completed the teaching/instructions for the course work of Paper-I conducted by the University from 17-04-2017 to 03-05-2017 satisfactorily for the course work of paper-I for registration for the Ph.D Programme.*

(Dr. Sharmila Rao)
Course Co-Coordinator

3/5/17
(Dr. Nawal Kishore Upadhyay)
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